FOREST PEST MANAGEMENT
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EVALUATION OF MEDICINE LAKE CAMPGROUNDS, DOUBLEHEAD RANGER DISTRICT, MODOC NATIONAL FOREST

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ABSTRACT

Three campgrounds at Medicine Lake were evaluated for current and potential pest problems. Pests noted that may interfere with management objectives for the campgrounds were lodgepole pine dwarf mistletoe (Arceuthobium americanum) and mountain pine beetle (Dendroctonus ponderosae). Other pests noted were western gall rust (Endocronartium harknessii) and Dasyscyphus canker (Dasyscyphus sp.). Overstocking in most areas is an additional stress factor. Management alternatives available to the land manager, including do nothing, thin dense aggregations, remove high risk trees and sanitize, prune dwarf mistletoe brooms, and plant other species, are discussed.

INTRODUCTION

The Modoc National Forest is in the process of preparing vegetation management plans for all major recreation areas. Therefore, Glenn Bradley, Forest Supervisor, requested an evaluation of three campgrounds on the Doublehead Ranger District for Forest Pest Management input to the plans. John Kliejunas and Dave Schultz evaluated Medicine Lake, Hemlock and Headquarters campgrounds on September 12 and 13, 1983.

OBSERVATIONS

Hemlock (22 units) and Medicine Lake (44 units) campgrounds are adjacent to each other on the north shore of Medicine Lake. Headquarters campground (10 units) is located a short distance from the west end of the lake. The surface elevation of the lake is 6676 feet. The soil, vegetation and pest conditions appear uniform throughout the Medicine Lake

basin. The volcanically-derived soils are very loose and appear to have low water holding capacity. Ground cover is sparse and consists largely of rabbitbrush with small amounts of grass and lupine. Lodgepole pine (with the exception of one white fir sapling at Headquarters campground) is the only tree species in the three campgrounds. There are a few small unstocked areas which apparently resulted from past mountain pine beetle, Dendroctonus ponderosae, attacks. Most areas of the campgrounds carry 200 to 500 square feet of basal area. All size classes of lodgepole pine are present. There are a few dense clumps of seedling-size trees exceeding 50 years of age.

Lodgepole pine dwarf mistletoe, Arceuthobium americanum, is widely distributed in all three campgrounds. Trees from saplings to overmature sawtimber are infected. The infections are most severe in old-growth overstory trees, with some of these trees having ratings (Hawksworth) of 5 and 6. Dwarf mistletoe brooms are common in these trees. This heavy infection is contributing to observed top kill. Scattered lodgepole pine reproduction is infected with western gall rust, Endocronartium harknessii. Galls on the main stem have been partially responsible for seedling or sapling mortality in a few instances. Many of the older trees have sunken cankers on the main stem. A canker-causing fungus, Dasyscyphus sp., was isolated from material collected in Medicine Lake campground. The cankers appear to have little direct effect on the health of the trees, however, they maintain an open patch of bare wood for extended periods of time. Wood boring insects and decay fungi have entered through large cankers in the butts of a few trees. The loss of considerable structural support may make these trees hazardous. In both Medicine Lake and Headquarters campgrounds, there are currently several mature lodgepole pines under attack by the mountain pine beetle.

DISCUSSION

The Medicine Lake basin contains several thousand acres of lodgepole pine monoculture under low intensity management. Normal stocking for lodgepole pine stands from 30 to 120 years old varies from approximately 100 to 200 square feet of basal area, depending on the site class. The stands surrounding the lake range in stocking from about normal to several times normal. These stands also have fairly high levels of dwarf mistletoe infection. Both the high levels of stocking and the dwarf mistletoe probably keep most of the stands in the area under stress. The result is a chronically high mountain pine beetle population which is constantly testing the trees in the area.

A considerable number of lodgepole pine have been killed in the campgrounds by the mountain pine beetle over the past few decades. Additional mortality can be expected unless corrective measures are undertaken. It is unlikely that the chronic population level of mountain pine beetle can be reduced because of the size of the area involved, the recreational emphasis in the area, intermingled private land, and the current low value of lodgepole pine. Measures to protect the campgrounds would have to involve increasing campground tree vigor.

The campground trees would be more vigorous if they were not infected with dwarf mistletoe. Because the infections are widespread and involve all size classes of trees, the only way of eliminating dwarf mistletoe would be to clear the campgrounds and regenerate with non-host trees or to maintain a host-free buffer around uninfected lodgepole pine regeneration. This would alter the campground appearance for a substantial period of time and may not acheive management objectives. Some other treatments could reduce the impact or compensate for the stress caused by dwarf mistletoe without eliminating it.

There are a few spots in Hemlock and Medicine Lake campgrounds where there are infected overstory trees near a uninfected or lightly infected understory. The amount of dwarf mistletoe seed reaching the understory would be reduced if the infected overstory trees were removed. This would not prevent the understory from eventually becoming infected, but it would delay it. This would extend the period of time that the current understory trees would be desirable to retain in the campgrounds.

There may be a desire to retain some infected overstory trees for aesthetic reasons, to provide diversity, or because they are the only trees in the area. Some overstory trees have large dwarf mistletoe brooms. The health of these trees could be improved and their lifespan extended 10 to 15 years by pruning the brooms. This would be feasible if at least 30 percent healthy live crown remained after broom removal. Some of the more severely affected overstory trees in the campground would not meet this guideline. Broom pruning would not reduce the spread or intensification of dwarf mistletoe in the campgrounds.

Thinning dense aggregations would reduce some stress and could partially compensate for the presence of dwarf mistletoe. The increase in vigor caused by thinning would also make the trees more resistant to mountain pine beetle attack. The level of stocking that would probably be appropriate for the campgrounds is about 70 to 80 percent of normal basal area. The site index was not measured in the campgrounds, but the fact that some areas currently support close to 500 sq.ft. basal area indicates the site is probably high. If the site index is assumed to be from 50 to 70, desirable levels of stocking would be 75 to 95 sq.ft. for 30 year old aggregations and 110 to 155 sq.ft. for 120 year old aggregations.

Discriminating against trees severely infected with dwarf mistletoe or trees with large brooms when thinning could have benefits beyond those normally expected. Such trees are often the most susceptible to bark beetle attack. The mountain pine beetle releases a pheromone after a successful attack. This pheromone attracts additional mountain pine beetles which may land on nearby healthy trees and overwhelm them by sheer numbers. Removing a high risk tree while it is green can eliminate the center of a potential bark beetle group kill.

There would be advantages to thinning dense lodgepole pine reproduction as early as possible. Dense reproduction surrounding overstory trees can compete with the overstory and hasten its decline. In addition to reducing stress on the overstory, thinning would stimulate the growth of

the reproduction and provide replacement trees in a more orderly fashion. It is possible that early thinning would also reduce the impact of weakly parasitic diseases such as Dasyscyphus sp.

One of the reasons that the campgrounds are so widely infested with dwarf mistletoe and that mountain pine beetle periodically kills groups of trees is that the solid stands of lodgepole pine present no barriers to the buildup or spread of these organisms. It is not known why other species of trees and brush do not occur in the campgrounds. Although the level of Medicine Lake fluctuates, most portions of the campgrounds are high enough above the lake that excessive soil moisture would not seem to explain the lack of other species. Other species occur within a mile or two of Medicine Lake at similar elevations and on what appear to be similar soils. Red fir, white fir, western white pine, mountain hemlock and manzanita are all present between the Lake and Little Mt. Hoffman to the west. These species could be used for screening or for revegetating open areas if they would grow successfully in the campgrounds. None of the species would be a host for lodgepole pine dwarf mistletoe, and none except western white pine would be attacked by the mountain pine beetle. Seedlings which would be suitable for campground use could be grown in the nursery, or local natural regeneration could be transplanted if it was root-pruned a year or two in advance.

MANAGEMENT ALTERNATIVES

1. Do Nothing. Lodgepole pine will probably be the only tree species in the campground for at least the next century. Dwarf mistletoe and overstocking will continue to cause reduced tree growth and low vigor. During most years, several trees will die in each campground and require removal. At intervals of 10 to 20 years there will be episodes of higher mortality which may include all of the trees at some individual campsites. Lodgepole pine will eventually seed into most open areas and form a dense carpet of reproduction. A few trees in which butt rot is advancing faster than the tree is growing may fail, however, this is most likely to occur during the winter when the sites are not occupied.

2. Thin dense aggregations. Thinning would increase individual tree vigor and decrease susceptibility to mountain pine beetle attack. Thinning would also partially compensate for the stresses caused by dwarf mistletoe infection. Thinning reproduction at an early age would reduce screening but would also reduce competition with the overstory and is more likely to produce healthy replacement trees.

3. Remove high-risk trees and sanitize. Trees which have signs of low vigor such as short needles, reduced needle complement, off-color foliage, branch die-back and flat-topped crowns have a high probability of becoming the center of a bark beetle group kill. Some group kills could be prevented by removing high-risk trees while they are still green. Removing all high-risk campground trees would sacrifice many years of potential service from some of them because it is unlikely they will all be attacked in the near future. Removal of some overstory trees which are heavily infected with dwarf mistletoe could slow the spread of dwarf mistletoe to nearby uninfected reproduction.

4. Prune dwarf mistletoe brooms. Dwarf mistletoe brooms are a drain on the energy reserves of a tree. Pruning the brooms will increase vigor and extend the life of the tree if at least 30 percent live crown remains after pruning. Broom pruning will not reduce the spread of dwarf mistletoe in the tree or in the stand because there are usually infections above the highest broom.

5. Plant other species in campgrounds. If tree species other than lodgepole pine would survive in the campgrounds, their presence would help reduce some pest-caused impacts. Other species would not be hosts for lodgepole pine dwarf mistletoe, while their foliage would serve as a physical barrier and intercept dwarf mistletoe seed. Other species, except western white pine and ponderosa pine, would not be hosts for the mountain pine beetle.

Non-host trees planted in the campgrounds would not affect the course of mountain pine beetle outbreaks as long as lodgepole pine remains the dominant species. Their presence at a given camp site would, however, insure that mountain pine beetle could not totally denude the site. The use of brush species for screening and traffic control would probably be more advantageous than using suppressed or wounded lodgepole pine reproduction which could harbor pests that could eventually affect the overstory.